Cooperative Agency Profilers (CAP)

Targets Of Opportunity

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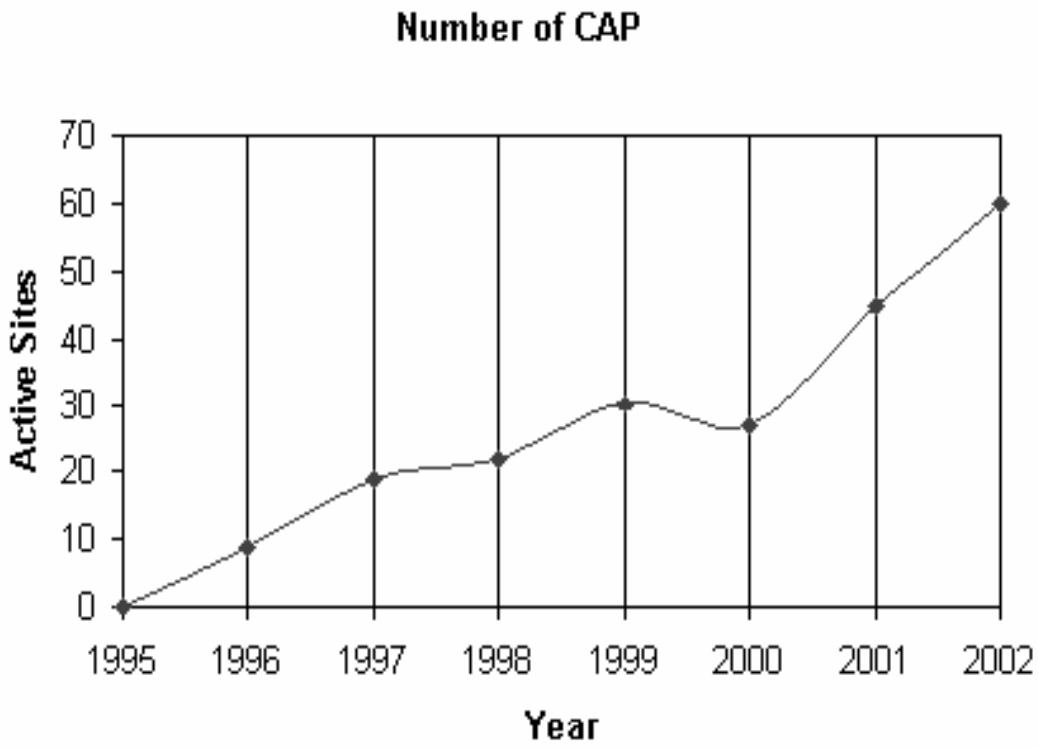
History

- 1970's – Aeronomy Laboratory builds first wind profilers for research
- 1980's – Colorado Wind Profiler Network built for research
- 1985 – NOAA Profiler Network initiated
- 1994 – NOAA Profiler Network assessment completed
- 1994 – Boundary Layer Profiler (BLP) Acquisition Project started
- 1997 - ~ 20 CAP active
- 1999 - ~ 30 CAP active
- 2001 - ~ 40 CAP active
- 2002 – ~ 60 CAP active. Project name changed from BLP to Cooperative Agency Profiler – profilers 'not just for the Boundary Layer anymore' as more tropospheric and lower tropospheric profilers are deployed by agencies.

Cooperative Agency Profilers



Increase in number of CAP from 1995 to 2002

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Who Cooperates?

- NOAA Environmental Technology Laboratory - 13 profilers
- NOAA Aeronomy Laboratory - 7
- Kennedy Space Center And Cape Canaveral Air Force Station - 5
- Argonne National Laboratory ABLE/ARM Programs - 3
- NCAR Sponsored By The FAA - 3
- South Coast Air Quality Management District - 3
- White Sands Missile Range (Meteorology Branch) - 3
- Dugway Proving Ground (DPG) - 2
- Environment Canada - 2
- Department Of Interior Minerals Management Service - 2
- North Carolina Department Of Environment & Natural Resources (DENR) & Division Of Air Quality - 2
- San Diego Air Pollution Control District - 2
- San Joaquin Valley APCD - 2
- Texas Natural Resources Conservation Commission - 2
- Several others with one profiler

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Map of the active continental CAP sites excluding Alaska

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Agencies Primary Missions

- Environmental protection and air quality monitoring (many)
- Space and Missile launch (Vandenberg, Cape Kennedy and White Sands)
- Research experiments (ETL, AL, Air Resources Lab)
- Dept. of Defense (Dugway)
- Aviation (Juneau, AK)

915 MHz profiler with RASS at Las Vegas

Courtesy of NOAA's Air Resources Laboratory

Cooperative Agency Profilers

Typical Characteristics

- Produce a wind profile every 5 to 30 minutes – high temporal frequency compared to every 12 hours for radiosonde.
- For all profilers, height coverage is dependent on atmospheric turbulence, moisture, transmitter power and profiler frequency.
- Range gate spacing and other operating parameters are variable and set dynamically by the operator of the radar for their specific mission

Cooperative Agency Profilers

Typical Characteristics

Frequency	915 MHz	449 MHz	50 MHz
Height AGL	>3 km	>8 km	>20 km
Peak Power	500 W	>2 kW	> 15 kW

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Rutgers, NJ Profiler

915 MHz profiler with RASS

Courtesy of Rutgers University

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Targets of Opportunity

- This project is an extension of the 1995 NPN processing infrastructure.
- Participation in the CAP project is strictly voluntary.
- No employees have ever worked full-time on this project. A level of 60 CAP in operation almost requires the attention of an operator full time.
- Total cost estimated at $439,000 to process these data from 1994 to present – a cost of approximately $1800/profiler/year

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Processing Infrastructure

Acquisition
FTP
GOES
WWW
Dial-up

Processing
Convert time to UTC
Convert to common file format
Add QC

Data Delivery
NWS
NCEP
FSL (Backup RUC, MADIS)
ETL
UCAR
Dugway Proving Grounds
National Atmospheric Release Advisory Center (LLNL)
Chesapeake Bay LAPS Model
www.profiler.noaa.gov

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Benefits to Agencies

- NPN adds advanced quality assessment information.
- Wind and RASS data available to the public, as graphics and raw data, on NPN website.
- Agencies often have limited budget for operations – the NPN provides monitoring and notification of profiler failure.
- Radar wind profiler experts in the Profiler Control Center can identify difficult technical problems and suggest solutions.

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Benefits to Public

High temporal frequency wind and RASS data from otherwise data-sparse regions aids in :

- **Improved Forecasts (National Weather Service)**
  - **Wind shear**
  - **Low level jets**
  - **Advection patterns**
  - **Inversion depth**
  - **Temperature profiles (RASS)**
- **Numerical Weather Prediction (NWP) – CAP data is 'in the tanks' at National Centers for Environmental Prediction - evaluation expected to begin in February 2003.**
- **National security – NWP models of atmospheric 'release' events (NARAC).**
- **General public – private aviation, wind surfing, hot-air ballooning, hang gliding, ultralight airplanes.**

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The Future

- Ability to display CAP data on NWS Advanced Weather Processing Information System (AWIPS)
- Provide GOES data collection implementation for CAP profilers.
- Improved quality control algorithms such as coherent interference detection, precipitation contamination.
- Automated comparison of profiler data vs. models and sondes for quality assessment.

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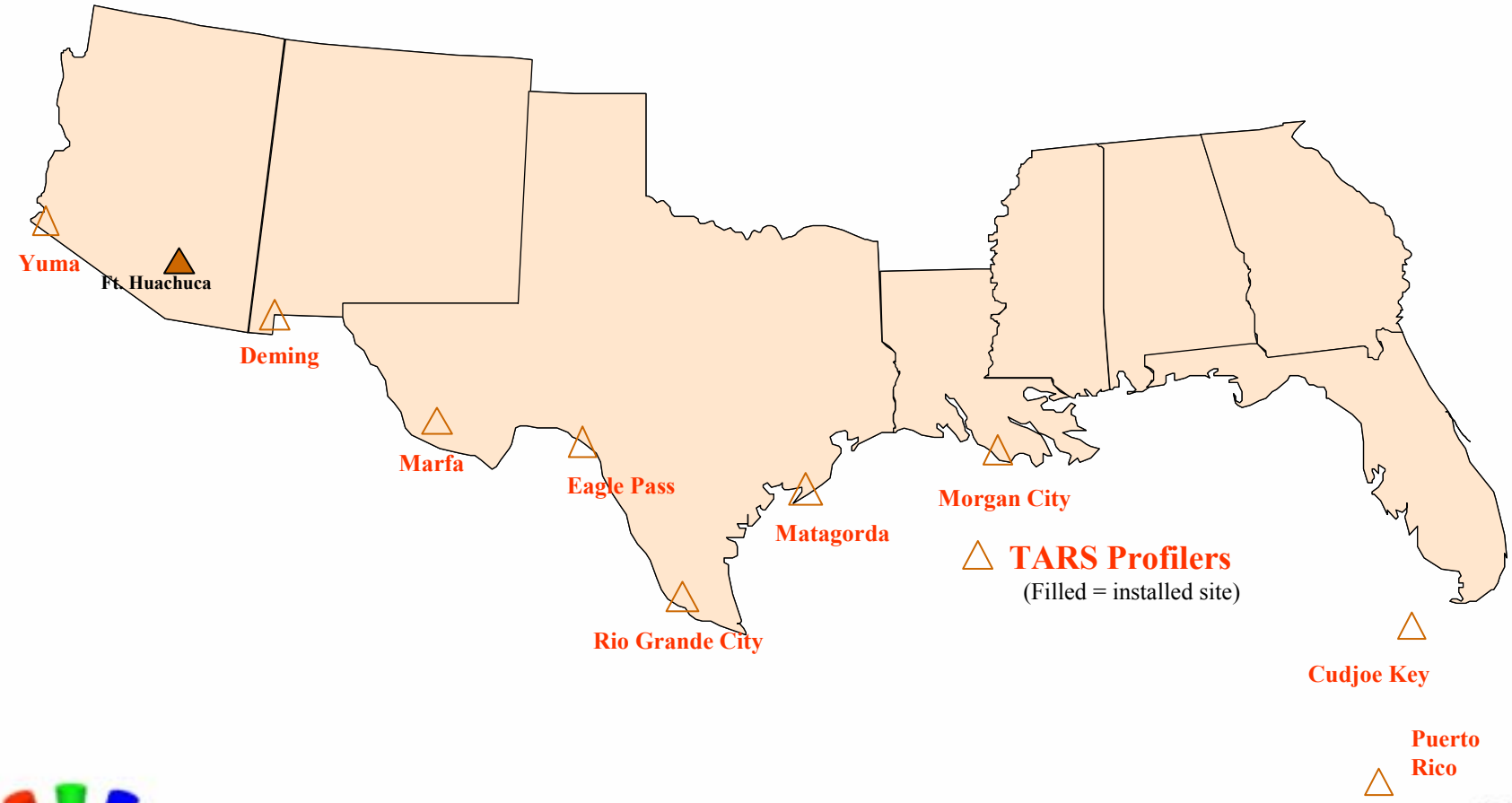
Location of TARS profilers



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The Future

TARS Aerostat – Wind profiler needed for operations

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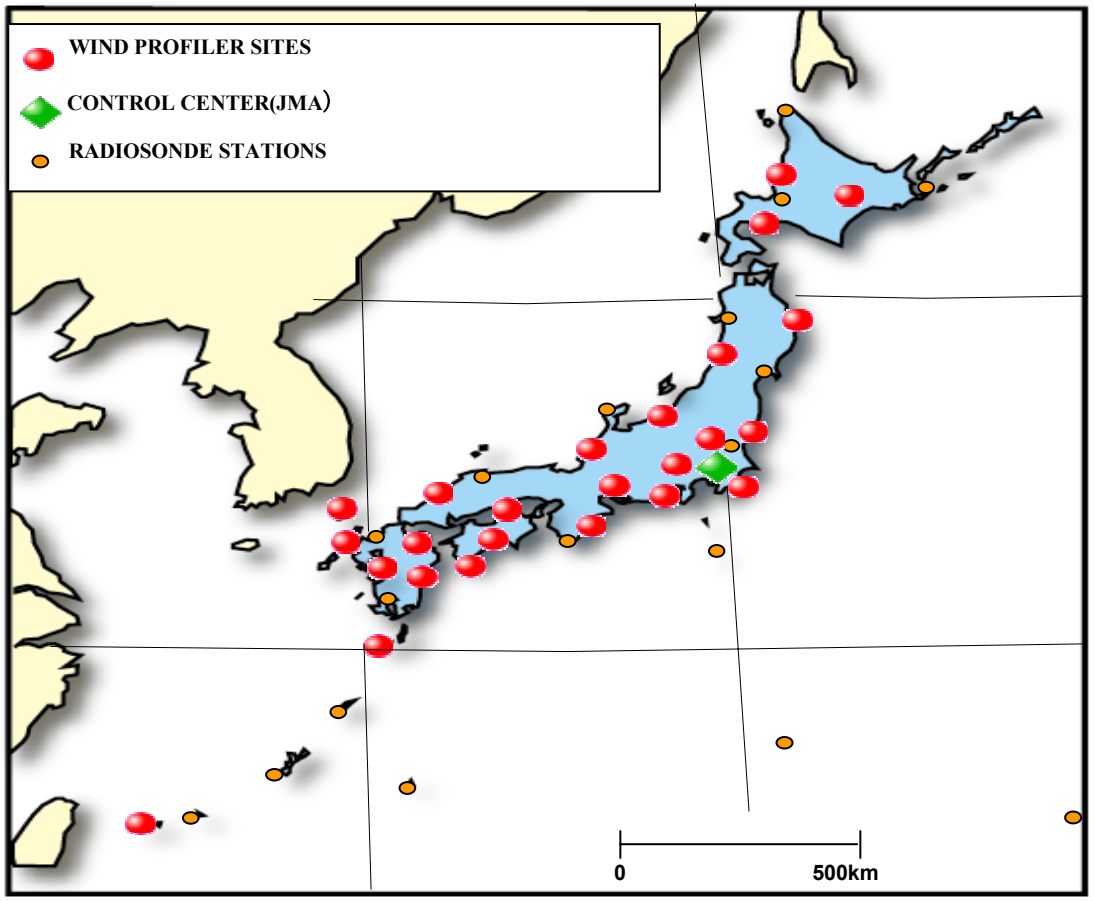
The Future



WINDAS - Japanese Meteorological Agency Profiler Network

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Summary

- Numbers of CAP are increasing – NPN set to add several more in the next few weeks.
- NPN has the infrastructure in place to acquire and distribute these data.
- Essentially zero impact on the Cooperative agency's primary mission and budget.
- The cost is low (~ $1800/profiler/year).
- Benefits the taxpayer primarily by improved forecasting with additional effect via improved data access for modeling and national security.
- Benefits the Cooperative agencies in that they do not have to become or hire profiler experts to monitor their systems and diagnose problems.
- Data archive available to public on http://www.profiler.noaa.gov